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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/553,876

10/21/2005

Hitoshi Kuma

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STEPTOE & JOHNSON LLP  
1330 CONNECTICUT AVENUE, N.W.  
WASHINGTON, DC 20036

EXAMINER

TSO, WILLIAM

ART UNIT

PAPER NUMBER

2879

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

**Application No.**

10/553,876

**Applicant(s)**

KUMA, HITOSHI

**Examiner**

William Tso

**Art Unit**

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 October 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 21 Oct 2005.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Specification*

1. The disclosure is objected to because of the following informalities:
  - On page 5 lines 16, applicant recites "electron infection layer 204". An "electron injection layer 2004" may be more appropriate.
  - On page 8 line 5, applicant recites amounts  $\delta_1$  and  $\delta_2$  and later gives an equation defining the amounts, however applicant does not identify what the amounts are.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. **Claims 1, 2, 7 and 8** are rejected under 35 U.S.C. 102(b) as being anticipated by **Utsugi (5,837,391)**.

Regarding **claim 1**, Utsugi clearly discloses an organic electroluminescent device comprising a transparent electrode **(21a)** (figure 3 and column 4 line 52), a counter electrode **(21c)** (figure 3 and column 4 line 59), an intermediate conductive layer **(21b)** (figure 3 and column 4 line 64) and organic emitting layers **(22)** (figure 3 and column 4 line 54-55) arranged between the transparent electrode and counter electrode. The material composing the intermediate

conductive layer is ITO (column 7 line 58), which has a refractive index of 1.8 in the visible range<sup>1</sup> and the organic emitting layer is composed of 8-quinolinol (column 5 line 24) and more specifically tris(8-quinolinol) aluminum (column 5 line 36) which has a refractive index of 1.73 in the visible range<sup>2</sup>. Therefore, the refractive index of the intermediate conductive layer and the refractive index of the organic emitting layer is less than 0.2. Also, said materials are disclosed by the applicant as materials that suit the needs of the instant invention.

Regarding **claim 2**, Utsugi clearly discloses an organic electroluminescent device comprising a transparent electrode (**21a**) (figure 3 and column 4 line 52), a counter electrode (**21c**) (figure 3 and column 4 line 59), an intermediate conductive layer (**21b**) (figure 3 and column 4 line 64) and organic emitting layers (**22**) (figure 3 and column 4 line 54-55) sandwiching an intermediate conductive layer, arranged between the transparent electrode and counter electrode. The material forming the intermediate conductive layer is ITO (column 7 line 58), which has a refractive index of 1.8 in the visible range<sup>1</sup> and the organic emitting layer is formed of 8-quinolinol (column 5 line 24) and more specifically tris(8-quinolinol) aluminum (column 5 line 36) which has a refractive index of 1.73 in the visible range<sup>2</sup>. Therefore, the refractive index of the intermediate conductive layer and the refractive index of the organic emitting layer is less than 0.2. Also,

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<sup>1</sup> Zeghbroeck, Bart Van. 1997. <http://ece-www.colorado.edu/~bart/book/ellipstb.htm>

<sup>2</sup> D.Z. Garbuzov et al. 1996. *Chemical Physics Letters* 249 (p.434).

said materials are disclosed by the applicant as materials that suit the needs of the instant invention.

Regarding **claim 7**, Utsugi clearly discloses the intermediate conductive layer formed of ITO, which is the same material as the applicant's. Therefore, the absorption coefficient of the intermediate conductive layer meets the requirement of being 2.5 or less.

Regarding **claim 8**, Utsugi clearly discloses a display unit (column 1 line 40).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims **1, 3 and 5-6** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Tanaka et al. (6,107,734)** in view of **May (US 6,211,613 B1)**.

Regarding **claim 1**, Tanaka et al. teaches a transparent electrode (**2**) (abstract), a counter electrode (**3**) arranged opposite to the transparent electrode (abstract and figure 2), one or more intermediate conductive layers (**4**) and one or more organic emitting layers (**5**) (abstract) arranged between the transparent electrode and the counter electrode (figure 2). Tanaka et al., however, does not teach that the difference between the refractive index of the intermediate conductive layer and the organic emitting layer is less than 0.2. In the same field

of endeavor, May teaches the refractive indices of the transparent electrode layer and organic electroluminescent layer to be similar (column 4 lines 14-15) to eliminate reflection between the interfaces of the layers to achieve good readability in typical indoor and outdoor light conditions and lower power consumption (column 4 lines 7-11). Therefore, it would have been obvious to one of ordinary skill in the art to have an OLED with the refractive index of the intermediate conductive layer and organic emitting layer similar to each other (less than 0.2) to prevent reflections of the light output between interfaces of layers to achieve good readability in typical indoor and outdoor light conditions.

Regarding **claim 3**, Tanaka et al. discloses an intermediate conductive layer by combining some layers of items (a) to (f) (column 7 lines 61-62). Where (a) an ultra-thin film metal/the transparent electrode (column 7 line 48) can be ITO (column 8 line 12) and (b) a mixed layer of an electron transport ability compound and an electron injection ability compound/the transparent electrode (column 7 lines 49-51), where the electron injection ability compounds can be LiF (column 8 line 22). Applicant discloses in the instant application that LiF is a material having low refractive index combined with a transparent electrode such as ITO to form the claimed intermediate conductive layer that has refractive index with difference of less than 0.2 compared to the refractive index of the organic emitting layer. Therefore, the LiF layer has refractive index less than the organic emitting layer and the ITO layer has a refractive index higher than the organic emitting layer.

Regarding **claim 5 and 6**, Tanaka et al. discloses an intermediate conductive layer by combining some layers of items (a) to (f) (column 7 lines 61-62). Where (a) an ultra-thin film metal/the transparent electrode (column 7 line 48) can be ITO (column 8 line 12) and (b) a mixed layer of an electron transport ability compound and an electron injection ability compound/the transparent electrode (column 7 lines 49-51), where the electron injection ability compounds can be LiF (column 8 line 22). Applicant discloses in the instant application that LiF is a material having low refractive index and ITO is a transparent conductive metal oxide.

6. **Claim 4** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Tanaka et al. (6,107,734)** and **May (US 6,211,613 B1)** in view of **Pei et al. (US 6,593,687 B1)**.

Regarding **claim 4**, Tanaka et al. teaches an intermediate conductive layer by combining some layers of items (a) to (f) (column 7 lines 61-62). Where (a) an ultra-thin film metal/the transparent electrode (column 7 line 48) can be ITO (column 8 line 12) and (b) a mixed layer of an electron transport ability compound and an electron injection ability compound/the transparent electrode (column 7 lines 49-51), where the electron injection ability compounds can be LiF (column 8 line 22).

However, Tanaka et al. and May does not teach that the intermediate conductive layer is a mixture. In the same field of endeavor, Pei et al. discloses that it should be evident that any electrode layer may be constructed as a laminate, composite or mixture of materials (column 11 lines 39-41). Therefore, it

would have been obvious to one of ordinary skill in the art to create the layer as a mixture as an alternative to a laminate.

Applicant discloses in the instant application that LiF is a material having low refractive index combined with a transparent electrode such as ITO to form the claimed intermediate conductive layer that has refractive index with difference of less than 0.2 compared to the refractive index of the organic emitting layer. Therefore, the LiF layer has refractive index less than the organic emitting layer and the ITO layer has a refractive index higher than the organic emitting layer.

### ***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- **Garbuzov et al. (US 5,874,803 A)**
- **Kido et al. (US 2003/0189401 A1)**
- **Kawase (US 6,815,886 B2)**
- **Liao et al. (US 6,936, 961 B2)**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William Tso whose telephone number is 571-272-9221. The examiner can normally be reached on Monday-Friday; 8:30am-6:00pm EST; First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on 571-272-2457. The fax phone



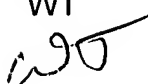
Art Unit: 2879

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

William Tso  
Examiner  
Art Unit 2879

WT



*Karabi Guharay*  
**KARABI GUHARAY**  
**PRIMARY EXAMINER**